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REPORT OF THE COUNCIL.

The Academy has lost fourteen members by death since the last report of the Council, — five Resident Fellows, Charles F. Folsom, Edward G. Gardiner, George E. Davenport, Edward H. Strobel, Gustavus Hay; six Associate Fellows, T. D. Seymour, C. A. Young, Asaph Hall, I. C. Russell, A. St. Gaudens, E. C. Stedman; three Foreign Honorary Members, H. C. Vogel, Sir Benjamin Baker, Lord Kelvin.

Three Resident Fellows have resigned.

Seven Resident Fellows have been elected.

One Resident Fellow has been elected to Associate Fellowship.

The roll of the Academy now includes 187 Resident Fellows, 92 Associate Fellows, and 65 Foreign Honorary Members.

SAMUEL CABOT.

Samuel Cabot, the fourth of the name, was born February 18, 1850, in Boston, where his father was an eminent surgeon. His grandfather, a successful East India merchant in the days before commercial supremacy had left New England, married Elizabeth Perkins, the daughter of Thomas Handasyd Perkins, founder of the Perkins Institution for the Blind. His mother, Hannah Lowell Cabot, was the daughter of Patrick Tracy Jackson, of Boston, celebrated for the introduction of the manufacture of cotton goods into America at Waltham and Lowell, and of Lydia Cabot, of Beverly. He was therefore descended on each side from a family noted for rugged independence, sturdy honesty, and devotion to high ideals.

He was the oldest son but second child in a numerous family dominated by the high ideals of which I have just spoken, as his father was one of the most vigorous supporters of the antislavery cause when this could not be done without sacrifice, and in this and all other matters the pursuit of the highest at any cost was impressed on the children by the precept and example of both parents. The life in his earlier days in Boston, and in the summer at Canton, was of necessity simple; those were the days of small fees, when a surgeon, even of his father's eminence, gained an income barely sufficient for the support of a large family. In fact, it was characteristic of Dr. Cabot that even to the day of his death he remained an uncompromising opponent to the high charges for surgical work which had already appeared. But if the life was simple, it was very full and happy; the family circle was bound together by a warm, almost passionate affection, and was surrounded by troops of friends both in Boston and in the country. All the burning questions of the day were discussed continually with great energy by the brothers and sisters, each one of whom was thoroughly convinced of the truth of his or her opinion and never backward in proclaiming it. The home atmosphere was therefore stimulating, both morally and mentally.

He was educated in the public schools, finally at the Boston Latin School, from which he graduated in 1866. Here he proved himself a painstaking but not brilliant scholar, as, like so many healthy boys, his interests were in athletic sports, especially baseball and football, rather than in his books.

On leaving the Latin School he was naturally attracted by the Massachusetts Institute of Technology, then in its infancy, since he inherited strong scientific tastes from his father, who was an excellent ornithologist and in his younger days had made scientific journeys. It is probable, however, that the impulse to chemistry came from the Jacksons, as his contemporaries in this family included nine professional chemists divided among three branches of the family, which had separated in the seventeenth century. If this does not indicate a strong family taste for chemistry, but is a mere coincidence, it is certainly a strange one, as chemistry is distinctly an unusual profession. Accordingly he entered the Institute in the third class received by it, and devoted his attention to chemistry principally under the direction of Professor F. H. Storer.

In 1870 he became chemist of the Merrimack Print Works at Lowell, and, while holding this position, introduced successfully a process for recovering alizarine from the spent residues of the madder root by the use of sulphuric acid, which was new to this country, — a remarkable achievement for a young man of twenty-two. It is striking to note that even as a beginner he was not content with the mere routine work of his position, but entered at once the field in which he was destined to reap such abundant harvests, for his principal merit lies in making effective, on a commercial scale, new processes, whether of his own invention or foreign ones as yet unknown in America. This adaptation of foreign processes is not by any means the simple matter which it might appear at first sight; great judgment is necessary in selecting the one best fitted to the needs of this country, and, after this is done.

the details must in many cases be reinvented, or, when not carefully guarded secrets, they usually need extensive modifications to fit them to American conditions, which differ in many and unexpected ways from those abroad. It would be a mistake, however, to suppose from this early success that he was a precocious genius, who leaped to results by some intuitive process; on the contrary, his mind moved rather slowly, and his early successes were obtained by patient, well-directed, persistent labor.

In 1873 he went to Europe to complete his chemical education, and studied for the first half year with Emil Kopp, in the Zürich Polytechnicum, where he gave part of his time to the analysis of aniline black, a dyestuff then recently introduced. The second half of the year was devoted to travel, and especially to visits to laboratories and chemical works. At this time he was only twenty-four years old, but it was striking to see the most eminent chemists receiving him as a fellow-chemist, and discussing scientific matters with him as with a contemporary. The acquaintanceships made at this time, and the practical knowledge acquired, were of life-long value to him.

In 1874, after his return to America with greater attainments and enlarged horizons, he attempted to establish at the Lowell Bleachery the Solvay process for making sodic carbonate, then only eleven years old, but without success. This is an excellent example of the difficulties in introducing foreign manufacturing processes. There was no lack of judgment in the selection of the process, as is shown by the enormous development of it at Syracuse, where it was started under the auspices of the mother company in Belgium ten years later; the details also seemed to be sufficiently well known, but the working out of these details so as to secure success needed not only the highest ability of the technical chemist, but also mechanical engineering of a most difficult and unusual sort, which at that time was beyond him. His failure, therefore, was not surprising or mortifying, and he had the happy faculty of learning from his failures, and, like Peter the Great, making them the school for later victories. After this he spent a short time in the office of his uncle, Henry Lee, learning business methods.

His only chemical papers date from this period, 1872–1877. They are seven in number and of good quality for a beginner, but he evidently soon realized that the publication of original researches was not his line of work, since he could be employed much more usefully for the community and himself in perfecting chemical manufactures. With this end in view he became the most expert consulting chemist for industrial work in this part of the country, and continued to give advice of this sort, as he could find time, until his own manufactures absorbed his whole attention.

It was in 1877 that he began business on his own account in partnership with Frederick Nourse. They established a coal-tar distillery at Chelsea, from which he hoped to develop an industry in fine organic chemicals similar to that which was then showing such wonderful growth in Germany, but the time was not ripe for such a growth in America; in fact, even now, thirty years afterward, this industry has not yet emerged from its infancy. Accordingly he turned his attention to the less varied list of products for which he found a demand. Among these, lampblack was the most important, and he at once improved the apparatus for its manufacture in his usual thorough, painstaking way. Mr. Nourse retired from the partnership in the autumn of 1878, and after this he had sole charge of the business, keeping himself a firm grasp on all departments of it, with the assistance of a series of able managers, — his brother-in-law, Mr. C. P. Nichols, Mr. Edward Cunningham, Mr. W. R. Cabot, and Mr. M. G. Bennett.

Always on the lookout for new fields of work, his attention was called at an early day to the gas region of Pennsylvania, in which he hoped to find mineral wealth similar to that of the Midland region of England. Although these hopes were not fulfilled, the investigation led him to the establishment in 1882–1883 of a plant at Worthington, Pennsylvania, for making carbon black by burning natural gas against a cast-iron plate beneath which the burner and black-box revolved. This method, which was in part, perhaps wholly, original with him, is still in use in the largest factory for this product. After a few years, however (in 1888), his brother, Godfrey L. Cabot, who had worked with him for a short time, took this business off his hands, and has carried it on successfully ever since.

At about the same time he began the manufacture of sulpho-naphthol — one of the most excellent disinfectants known; and another profitable new industry, rendered effective by him somewhat later, was the preparation of creosote shingle stains. Many attempts had been made in foreign countries to use creosote as a basis for paint, but none of these had been crowned with success. He, however, had the penetration to see that such a paint or stain would be specially adapted for use with shingles, which were essentially unknown abroad, and after this a painstaking study of the details and great care and thoroughness in the manufacture led to a complete victory over the difficulties, which had proved too much for his predecessors. His insulating felt for deadening sound, keeping out cold, and fireproofing, was an entirely original idea. It consisted of eel-grass quilted between two layers of asbestos or felting, and proved especially well adapted for these purposes, thus furnishing a use for a very cheap and hitherto worthless material.

Not every experiment was a success, however; as with all inventors, his path was strewn with failures, for it was not enough to make a process work, but it must also pay. Thus, for instance, he invented a set of stains on a creosote basis for interior use in houses, but, although admirable from the technical and artistic standpoints, the demand for them was so small that it was not worth while to manufacture them.

At the time of his death his principal products were shingle-stains, lampblack, deadening-felt, sulpho-naphthol, benzol, naphtha, brick preservative, sheep dip, mortar colors, black varnish, and coal-tar pitch. I give this list to show how far he had departed from his original plan of establishing a varied manufacture of fine chemicals, as it seems to me a remarkable proof of his sagacity that he was able to select products for which there was a demand, instead of wasting his energies on lines of work for which the country was not prepared.

One of his most interesting achievements was the successful establishment of a system of profit-sharing with the operatives of his factory. I am fortunately able to give an account of it in his own words, taken from an address on the subject delivered a few years ago before the American Social Science Association.

"At a very early period in my business experience it appeared to me that the rewards ordinarily offered to the wage-earner were not such as to stimulate him to the best exertion nor foster in him the best and kindest feelings toward his employer.

"Even to-day is it not true that in the great majority of cases the wage-earner's only stimulus is the desire to hold his job? In fact, is not the fear of discharge the only incentive to exertion in a large majority of cases?

"Feeling as I did, and still do, that men can always be led more successfully than they can be driven, that Hope as leader and captain can accomplish more than Fear as tyrant and slave-driver, I set myself — ignorantly and crudely to be sure, but earnestly — to try to do better things. My method has grown to be essentially as follows:

"Every man who enters my employ is given the current rate of wages for similar work. If he desires also to participate in the profit-sharing, he is required to sign a paper in which he promises to do his work as quickly and carefully as possible, remembering that the greater the yield the larger the profits, and to give me sixty days' notice before leaving me.

"On my part, I promise to divide, at the expiration of each six months, a certain fraction of the profits among the participants, strictly in proportion to the wages of each during that period. This sum in each case is divided into two equal parts, one of which is given in cash to the employee and the other is deposited in a savings-bank by me as his trustee.

"This fund in the bank is in the nature of an insurance upon the life of the employee, and is given over with interest to his executors, if he dies. It, however, does not come back into my hands. If he should, for instance, refuse to give me sixty days' notice on leaving me, although he had already received an equal amount in cash upon the promise to give me such notice, the money would not come back to me, but would simply be distributed among the other participants at the next division.

"The same is true in case of his discharge for cause.

"In case of sickness I am empowered at my discretion to draw upon his fund, though in temporary cases I always put sick men on half-pay for a considerable time without recourse to their fund. I also have the right to lend him money upon it to build a house. And now let me give you a few figures.

"The system was begun a little over seventeen years ago, and has gone on uninterrupted up to the present time. The profit-sharers at the outset numbered 21, and to-day number 42. The total amount paid out by me has been $40,464 during that period. Now the natural question which you all will ask, I think, is, Has this been a good bargain? I think you will all agree that in the ultimate analysis no bargain is a good bargain that is not profitable to both sides. Well, there will, I think, be no dispute that from the workman's point of view the bargain has been a good one, as he has a very considerable addition to his wages, which were as high as other labor of the same kind; and I may say that the average wages have steadily advanced as the efficiency and skill increased.

"But now comes the question of my own investment: What means have I of knowing that the efficiency of the workmen has been increased to an amount equivalent to the $40,464 which I have expended?

"I will now give you a few more statistics which bear upon this question. Let me remind you that the same proportion of the profit was paid to the 21 men who first entered the agreement that is now paid to the 42 men who compose the present corps. But now note this very significant fact. While the first payments averaged about 10 per cent upon the wages of each man, the last payment — which was larger than usual, to be sure — was exactly $21\frac{3}{10}$ per cent of their wages.

"It seems to me obvious that, if we can draw any inference from these facts, it is that, inasmuch as my profit compared to the wages paid has increased, the efficiency of my workmen has improved.

"But, above all, my own observation has convinced me that the *morale* of my employees is much superior to the average, and that they are more contented and willing by far than is usual in similar establishments. In fact, I am satisfied that this bargain has been a good bargain, a good one for both parties to it, and that the extra money I have laid out has been well and profitably invested.

"I have, for obvious reasons, not laid any emphasis upon the philanthropic side of this enterprise, especially as I am sure it can be recommended to many, if not to most, manufacturers, and to their employees, purely upon its utilitarian advantages; but it is obvious that it stimulates both sobriety and thrift in workmen, and that it can be made to assist men of family to build homes for themselves, thus surrounding the factory with the homesteads of men who are interested in its success and that of the neighborhood.

"From my seventeen years' experience, therefore, gentlemen, I can cordially recommend profit-sharing on this or a similar plan as of marked advantage to both employer and employed."

I have quoted this paper almost entire, because it seems to me to show the man — his desire for the good of others, joined to sound business common sense, and the practical wisdom needed to make the scheme effective. That it was effective is shown by the fact that, when a new hand was inclined to be indolent, the other workmen insisted on vigorous work from him if he was to stay in the factory, for, said they, "We will not have our profits cut down by the lazy or inefficient." It will be observed that the success of this system depended on an absolute trust on the part of the men in the uprightness of their employer. The slightest suspicion that it would not be carried out equitably, or that in some underhand way it would redound to the profit of the chief, would have wrecked it at once. And here the comparatively small number of men was a potent factor, as they were all able to know Mr. Cabot personally, and to realize his absolute honesty and fairness. That they also learned to love him appeared from the impressive sorrow with which they attended his funeral.

This absolute honesty and fairness was also conspicuous in his business relations. He would often make concessions beyond what could be justly demanded, if he thought the claim was made in good faith, while, on the other hand, he would not yield an inch when this was not the case, but proved a dangerous and pertinacious adversary. In one case at a very early stage in his career a man who had circulated malicious stories about his goods was forced to sign a written retraction couched in the most abject terms.

His business activities would have been enough to exhaust the energy of most men, but he found time and strength for the enthusiastic pursuit of many other interests. He was a most devoted son of the Institute of Technology, always ready with advice or more material help. In 1889 he was elected to the Corporation intrusted with its government, and in spite of his strong opinions and fighting blood won and kept the respect and affection of all his fellow-members. He was a member of the executive committee for many years, and very active on committees in charge of special departments, serving at various times on those on chemistry, chemical engineering, physics, botany, biology, modern languages, and English. His principal interest was naturally in the Chemical Department, which he watched over with unceasing care. He even induced Professor Lunge to come to Boston from Zürich to examine it, and make suggestions in regard to the best methods for teaching industrial chemistry.

Nor did he confine his attention to the Institute of Technology, as for many years he was a member of the "Committee to visit the Chemical Laboratory" of Harvard University, and in this capacity gave much useful advice about the organization of the course in industrial chemistry, in which he advocated the teaching of broad general principles rather than instruction in details, showing in this way a power of rising above the narrowing tendency of the highly specialized work by which alone a chemical manufacturer attains success.

He was devoted to athletics throughout his life, telling with gusto in one of his last years how he had beaten a much younger man at tennis, and about the same time causing the publication of a delightful volume of reminiscences by the idol of his boyhood, Lovett, the pitcher of the Lowells. This interest influenced his relations with the Institute of Technology, as he was a member of the Advisory Council on Athletics, and gave a tract of land in Brookline for a playground. He also established an annual prize for the greatest improvement in athletics, and gave a silver cup, on which the names of the victors were inscribed each year. It is almost needless to add that his influence was always used in maintaining the highest ideal of sportsmanship. In addition to these gifts for athletics he gave his house in Brookline for a dormitory, and was always ready to answer any pressing need.

He threw himself with the same enthusiasm into other recreations. Thus he made a careful study of the theory and construction of aeroplanes, for many years carrying on experiments in the summer on kites, studying especially the resistance of the air to various forms, and the effect of atmospheric currents. While in Europe in 1896 he saw Maxim and Lilienthal, and provided the latter with money to carry on his work; and in this country he stood ready to help the Wright brothers, when the time should come to make their experiments public.

Another engrossing pursuit was the study of the authorship of the plays of Shakespeare. He espoused the Baconian theory with great vigor, and defended his position by elaborate and costly investigations. His fine taste for art made him an authority on this subject also, and proved of great use to him in some of the branches of his business.

He was elected a fellow of our Academy in 1893, and served on the C. M. Warren Committee from its establishment in the same year until his death. That he held no other office was from his own choice, since he was at one time elected treasurer of the Academy, but declined to serve. He was also a member of the Society for Chemical Industry.

In 1878 he married Helen Augusta Nichols, of Lowell, and they had two children, a daughter and a son. In his family and society his genial, affectionate nature won all hearts. It made one happier for the whole day simply to exchange a few words with him in the street.

This life, so full of various beneficent activities, was brought to an end by a sudden attack of pneumonia, November 26, 1906.

In looking back at his life the most striking characteristic was, I think, his very high standards. It was not enough that he should be successful from a worldly point of view, but in all his undertakings the good of the country was a prime consideration; the introduction of new and useful processes, the utilization of waste materials, were his objects quite as much as his own personal advantage. Further, all his products must be of the highest quality, all his processes brought to the highest perfection. His probity was without a flaw, and anything mean or underhanded aroused in him a scorching, disdainful wrath, — for he was always a fighter, never afraid of an outspoken expression of his opinion; yet even in his more vehement controversies his antagonists could never lose sight of his sincerity of purpose and his large, warm heart. With all his vehemence of opinion his character was a singularly gentle and affectionate one, so that his genial nature won the love of all who knew him well. His thoroughness in all his pursuits, and the good judgement with which he selected or abandoned his manufacturing experiments, have been dwelt on sufficiently in the narrative of his life; but not enough has been said there of his generosity — always on the watch to help the deserving, yet concealed so carefully that in one case at least even the person benefited did not know from whom the help had come. To these he added a modesty and humility which led him always to undervalue his ability and attainments, a purity so feminine that it was respected even by the wilder men whom he chanced to encounter in his youth, and a strong and vivid imagination both in his experiments and recreations.

His ruddy face under a mass of curly hair always beamed with a genial light; and he seemed to glow with exuberant life and enthusiasm while he discussed some important subject in a slow rather hesitating manner, as if his abundant ideas found difficulty in gaining utterance. It seems impossible to believe that this overflowing vitality is no longer with us.

CHARLES LORING JACKSON.